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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

18

DATE MAILED: 08/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
09/381,295

Applicant(s)  
Aihara

Examiner  
Tracy Dove

Art Unit  
1745



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Jun 3, 2002
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-18 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-7, and 9-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.

- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 15 6) ☐ Other:

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**DETAILED ACTION**

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This Office Action is in response to the communication filed on 6/3/02. Applicant's arguments have been considered, but are not persuasive. Claims 1-3, 5-7 and 9-18 are rejected in view of the prior art. Claim 4 is canceled and claim 8 is allowed. This Action is made FINAL, as necessitated by amendment.

***Claim Objections***

Claim 1 is objected to because of the following informalities: in line 12 "not less the" should be "not less than". Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3, 5-7 and 9-18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites the weight ratio of the adhesive resin to the filler is not less than 1/5, however, the specification only provides specific examples of weight ratios and does not support all ratios "not less than 1/5". Similarly, claim 16 recites the peel

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strength is not less than 50 gf/cm, however, the specification only provides specific examples of the peel strength values and does not support all peel strength values "not less than 50 gf/cm".

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

Claims 1-3, 5-7, 9, 10, 14, 15 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Takeuchi et al., US 6,096,456.

Takeuchi discloses a film for a separator. The film for separator or separator may contain a resin such as polyvinylidene fluoride (PVDF) and the solvent may be N-methylpyrrolidone. To increase the strength of the film and the amount of electrolytic solution, alumina particles (non-conductive filler) are added. Alumina particles are particularly preferred in view of stability and ease of compounding. The ion-conductive separator is combined with a positive electrode and a negative electrode, each compounded with a solid polymer electrolyte, thereby obtaining a battery such as a solid Li secondary battery free of leakage of the solution and capable of free shaping.

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The size of the alumina is 0.01 to 100  $\mu\text{m}$ , more preferably 0.01-30  $\mu\text{m}$ . The polymer material can even in the holes within the electrodes. See col. 14, lines 5-28; col. 16, line 1; col. 17, lines

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~~62 col. 18, lines 30; col. 18, lines 66-67; and col. 25, lines 27-29. Electrolyte salts are disclosed~~  
in col. 16, lines 5-10.

Figure 1 teaches a positive electrode 1, a negative electrode 3 and a separator (of the invention of Takeuchi) 2. Figure 2 teaches a positive electrode 1, a negative electrode 3, a separator (of the invention of Takeuchi) 2 and a separator 7. Takeuchi teaches a novel film for a separator and a separator for an electrochemical cell (col. 3, lines 36-37). Thus, the novel separator material may be used as a layer on a conventional separator or as the separator alone. Example 50 teaches a graphite negative electrode coated with the polymer material containing alumina. The polymer/alumina composite film was formed on the graphite negative electrode. Further, the polymer/alumina film was laminated with a lithium cobaltate positive electrode. The cell was impregnated with an electrolytic solution (lithium salt and ethylene carbonate/propylene carbonate solvent) to obtain a lithium ion secondary battery as shown in Fig. 1 (col. 53, lines 20-45). Example 50 teaches the polymer/alumina film is prepared as in Example 44. Example 44 teaches the polymer/alumina film of Example 44 is prepared as in Example 43 except for using the same amount of alumina in place of the polymer beads. Example 43 teaches 1.50 g of the polymer and 0.05 g of polymer beads were used. Thus, Example 50 teaches 1.50 g of the polymer and 0.05 g of alumina in the polymer/alumina film. Thus, the claim limitation "a weight ratio of the adhesive resin to the filler is not less than 1/5" is anticipated by Takeuchi.

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Thus the claims are anticipated.

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*Claim Rejections - 35 USC § 103*

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-7 and 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita et al., US 6,287,720.

Yamashita teaches a battery comprising a positive electrode, a negative electrode and a sole porous separator (adhesive layer) disposed between the positive electrode and the negative electrode. The three layer structure is disposed in a casing containing an electrolyte. The porous separator includes at least one insulating substance (filler). See abstract. Example 2 teaches a separator having insulating particles of alumina with an average particle diameter of 1.0  $\mu\text{m}$  and a PVDF binder. The particles of alumina and particles of PVDF were mixed with each other to obtain a powder mixture. Then NMP was added to the mixture to obtain a slurry. The slurry may be applied to either or both electrodes and dried to obtain the separator. See col. 22, lines 1-36. See col. 23, lines 16-22 for disclosure of the organic electrolyte containing lithium ions of instant claim 2. Yamashita teaches it is preferred that the binder is used in an amount of from ~~1/500 to 5/3~~, more preferably from ~~1/500 to 1/2~~, most preferably from ~~1/500 to 1/5~~, in terms of the volume ratio of the binder to the particles of the at least one insulating substance (alumina). See

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~~col. 7, line 66-col. 8, line 4. Note alumina is preferred as the insulating substance, col. 7, lines 33-~~

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37. The possible insulating substances are disclosed in col. 6, line 58-col. 7, line 17. The cell of Yamashita can be used in the form of a spirally wound structure in which the unit cell is spirally wound so that the negative electrode of the wound unit cell is positioned on the side of the outer surface of each wind of the spirally wound structure, or in the form of a laminate structure in which a plurality of the unit cells are laminated so that each positive electrode is positioned opposite to a negative electrode through a separator. See col. 13, line 58-col. 14, line 9. The alumina may be a particle size of 5 nm (0.005  $\mu\text{m}$ ) to 1  $\mu\text{m}$ , most preferably (col. 7, lines 47-51).

Yamashita does not explicitly teach the electrodes have an uneven surface.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have known that the surfaces of the electrodes, when formed, are uneven. This is evidenced by Takeuchi which teaches the electrodes have holes, or are uneven (col. 25, lines 17-29). The background section of the instant specification teaches that electrodes have their surfaces smoothed by pressing but still have unevenness of several microns to form vacancies where a conventional separator and the electrodes are not in contact (bottom of page 3-top of page 4). Thus, the skilled artisan would have known that electrodes generally have an uneven surface.

Note that since the materials of the inventive separator of Yamashita (Example 2 teaches alumina and PVDF) and those of the instant invention (all the Examples in Table 2-4 teach alumina and PVDF) are the same, the separator material of Yamashita will also fill any space in

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an uneven electrode surface. Similarly, one of skill would expect the inventive separator of

Yamashita to have a peel strength similar to that of the instant claims.

Claims 11-13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeuchi et al., US 6,096,456.

See discussion of the Takeuchi reference above.

Takeuchi does not explicitly teach claims 11-13 of the instant invention.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because Takeuchi teaches that the positive electrode/separator/negative electrode structure is capable of free shaping. See col. 18, lines 25-30. Also in col. 34, lines 17-20 Takeuchi teaches that batteries of various shapes can be produced. Thus, Takeuchi provides motivation to roll up or fold the positive electrode/separator/negative electrode structure of Takeuchi. Takeuchi teaches and suggests a roll-type battery in col. 26, lines 16-27.

Note that since the materials of the inventive separator of Takeuchi (teaches alumina and PVDF) and those of the instant invention (all the Examples in Table 2-4 teach alumina and PVDF) are the same, one of skill would expect the inventive separator of Yamashita to have a peel strength similar to that of the instant claims.

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*Response to Arguments*

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Applicant's arguments filed 6/3/02 have been fully considered but they are not persuasive.

TAKEUCHI

Applicant argues "in contrast to the claimed invention, Takeuchi discloses batteries comprising a separator". All batteries must have a means of separating the positive electrode from the negative electrode. Takeuchi teaches a thin film battery having a positive electrode, a separator and a negative electrode. See Example 50 and Fig. 1. The separator of Takeuchi may be a composite film with a support. A particularly preferred support is alumina particles. See col. 18, lines 1-13. Therefore, the "separator" of Takeuchi is the same as the "adhesive resin layer" of the instant invention. See discussion of Takeuchi above.

YAMASHITA

Applicant argues "Yamashita fail to disclose a sufficient amount of PVDF to bond a positive electrode to a negative electrode to form a battery body". This argument is not convincing because Yamashita discloses the same volume ratio of resin (PVDF) to alumina as disclosed in the instant claims.

Note this limitation is not found in independent claim 1. Only claim 16 recites a peel strength value and only claim 15 recites PVDF. Furthermore, the claims do not exclude a battery with a casing.

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It is unclear how Applicant "estimated" the peel strength of Yamashita to arrive at the submitted figure illustrations filed with this amendment. The volume ratios of the instant claims

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are disclosed by the Yamashita reference. The figure illustrations are not an accurate comparison between the instant invention and Yamashita, thus they are not persuasive.

Yamashita teaches the use of "extremely fine particles". See discussion of Yamashita above.

### *Conclusion*

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan,

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~~who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-~~

0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

August 14, 2002

  
CAROL CHANEY  
PRIMARY EXAMINER